# An Application of DREFT to Re-education of Drivers

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By

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The applicability of DREFT (driving recorder of equipment-free type) to the re-training institution was examined through the comparison between the two methods of guidance, oral only and oral with TV, in the re-training course for those drivers who were dealt with the administrative measure.

Generally drivers examined here showed poor driving performance and large individual differences in the driving skills were found. The improvement of their driving performance was much larger after the oral guidance with TV than after the oral guidance only. Personal factors, such as ages, their driving areas, whether they were professional drivers or not, and so on, were found to contribute to the degree of the improvement. From these analyses the profiles of the easily-improved drivers and that of the hardly-improved drivers were made clear. It was concluded that DREFT could be of practical use in analyzing the driving performance and in the guidance of the re-training course.

## Introduction

The authors of this paper have wrestled with the development of a new experimental car for the purpose of observing natural driving behavior objectively and applying it to the improvement and guidance of the safety-driving. The experimental car is furnished with the equipment for recording both driver's eye-movements and his hands and feet operations by videotaped recorder system. This equipment has been called DREFT (driving recorder of equipment-free type).

The details of DREFT and a part of the analyses of the driver's behavior with DREFT were reported in the preceding paper (Maruyama, *et al.*, 1975). It can be thought that the behavior analyses have their significance when they are connected to the driver's education. DREFT can be used in the training course because it can produce the driver's problematical behavior audio-visually so that trainees can get suggestions easily from it.

Since 1973, this DREFT has been utilized in the course of guidance for persons punished by a long-term administrative measure at Miyagi Safety Driving School. Then two kinds of guidance were tentatively employed, a method for orally pointing out

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individuals' problems which had been made clear through the analyses of driving performance with DREFT, and the other method for doing so with the aid of VTR picture as a visual feedback as well as oral guidance.

This paper examines the effectiveness of DREFT as a guidance technique for safety-driving correction through the comparison between the two methods of guidance.

## Method

4 drivers were selected randomly each week out of those who were attending the re-training (or correction) course at Miyagi Safety Driving School. They were those whose motor licences were suspended for more than 90 days as an administrative penalty owing to some accidents or violations of the traffic regulations. The selected drivers were required to drive a car for about 7 minutes along the designated model road in the school as part of a training course for improvement of driving skills. Drivers' behaviors including eye-movements were recorded while they were driving the experimental car equipped with DREFT. Immediately after the driving, the record was played back, and the instructors checked and listed up the problematical points. The 4 drivers were divided into 2 groups, each group consisting of 2 drivers. One group were given oral guidance about the checked problematical behaviors (OG-group). The other were given guidance as to their checked behaviors while they were watching the TV pictures which had been recorded and played back (TV-group). Therefore, the latter group got additional information through TV. After the guidance was over, the same course was driven by the drivers and their driving behaviors were recorded again. Data obtained were analyzed for 2 groups, each group consisting of 47 drivers, and what changes were brought about before and after the training by the kind of guidance was analyzed.

Analyses were carried out of the driving behaviors which had been judged as problematical from the standpoint of safety-driving in the Road Traffic Law. The behaviors which had been judged as problematical by the consensus of more than two research staffmen were scored as follows. The unconfirmation which might lead to apprehended traffic accidents was regarded as serious. No confirmation or imperfect confirmation at a blind intersection scored 5, at a clear intersection scored 3. No rear-confirmation in changing lanes scored 2. Nonobservance of "going slowly" or "temporary stopping", scored 4, imperfect ones, 3. Nonobservance of lane-changing or appointed speed, scored 2. Turning without using a traffic indicators, unsuitable turning to the right or the left, scored 1, etc.

The difference of the total scores, and especially scores of safety-confirmation were compared between before and after each guidance was performed. In addition to the comparison based on the scores, further minute examination was done, referring to the individual career (ages, his driving area, whether he is a professional driver or not, etc).

## Results and Discussion

Fig. 1 represents the distribution of the total scores of 47 drivers in the problematic driving behavior during the first and second driving in the "TV-" and "OG-group". Fig. 2, likewise, shows the distribution of the safety-confirmation scores. Remarkable individual differences existed in driving skills as exemplified in the dispersion of scores and their skills were supposed to be rather poor. For reference, performances scored over 8 would make a driver fail in the drivers' licence examination.

Fig. 1 revealed as the result that the scores of both groups represented somewhat similar distributions (Mdn=10 for both TV- and OG-group) in the first driving, while in the second, the TV-group showed lower total scores than the OG-group (Mdn=1 for TV and 4 for OG), with the scores clustering about 0 and 1. This tendency was more remarkable in the safety-confirmation scores.

The above results clearly indicate that each guidance is available for improving the problematic behaviors including safety-confirmation, but that the improvement will be larger in the guidance using TV.

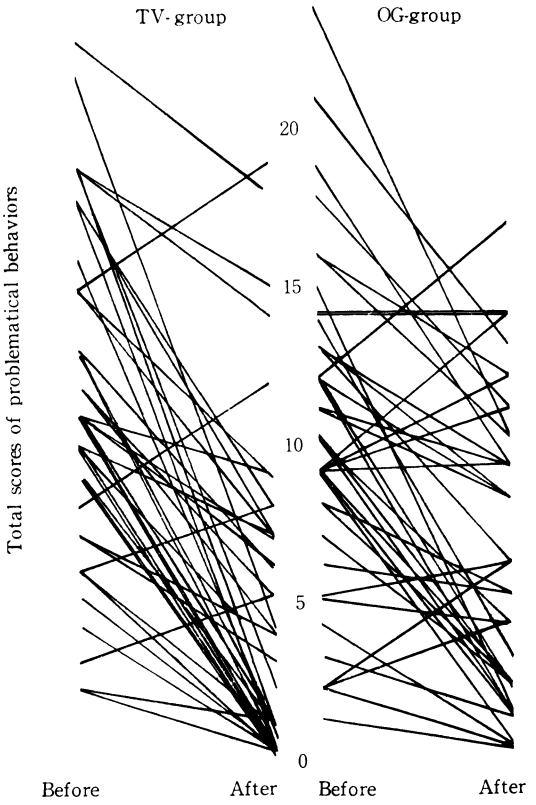


Fig. 1. Changes in total scores of problematical driving behaviors between two groups before and after guidance.

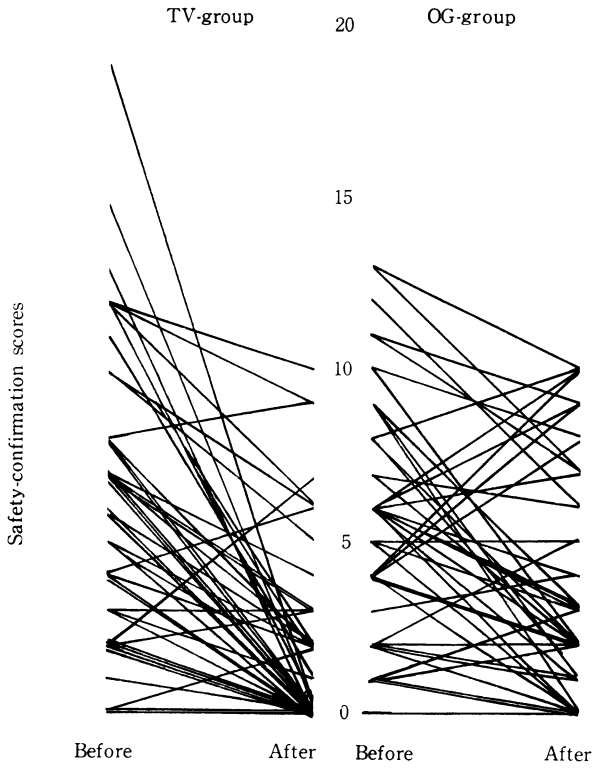


Fig. 2. Changes in safety-confirmation scores between two groups before and after guidance.

The rear-confirmation in "changing-lanes" has often been taken into account in the guidance which emphasizes the drivers' safety-confirmation. As a result of the close examination of this lane-changing behavior it was found that the drivers who showed improvement in making rear-confirmation after guidance increased in number in TV-group and that the mode of confirmation became more reliable, that is, in TV-group most of those drivers who once had made rear-confirmation with only one mirror now were able to make use of more than one mirror, and most of those who had never depended on a mirror, now showed signs of using mirrors.

Further, "looking aside in driving", which can be easily be taken into consideration as one of the personal bad habits in driving, has almost completely disappeared on the part of the TV-group, although this was not counted in scores.

By examining the data in Fig. 1 on the basis of the individual change in scores, it was found that on the second driving, 24 drivers in the TV-group showed much improvement as indicated by such scores as 0 or 1, while only 9 drivers achieved the same results in the OG-group. On the contrary, drivers who showed no noticeable improvement on the second trial, i.e., those drivers with the change ratio below 0.19,

numbered 8 in the TV-group, while OG-group numbered 18. The change ratio equals (the scores in the 1st driving − the scores in the 2nd driving)/(the scores in the 1st driving+the scores in the 2nd driving). Moreover drivers who showed little change in their basic driving manner, which could not be evaluated solely from the change in scores, were found rather large in number among the OG-group.

When the drivers' career was taken into account, all the drivers within the OG-group who showed much improvement ranged in age from their 10s to 20s, and most of them were professional drivers. 70% of drivers in TV-group who showed remarkable improvement were in their 20s. On the other hand, all in the TV-group who showed no improvement or even became worse in their performance were above 30 years of age and most of them were private drivers, in the rural area.

From the above, it can be seen that younger professional drivers seem to be readily modified and improved only through oral guidance, although receiving TV-guidance only once will not be enough for somewhat elderly private drivers in the rural area and it will be more desirable for them to be given step-by-step guidance.

The above may serve as a criterion in selecting the subjects for whom DREFT can be effective employed in the correctional institutions which have to deal with a large number of them.

There are a few problems yet to be examined, but findings to date have indicated that the DREFT serves as an effective means of correction-guidance for safety-confirmation through finding individual habits of driving.

## References

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